

文献精读

王波

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The Preventability of Ventilator-Associated Events:

The CDC Prevention Epicenters' Wake Up and Breathe Collaborative

AJRCCM, published ahead

Introduciton

- Mechanically ventilated patients are at risk for multiple complications of critical care including pneumonia, acute respiratory distress syndrome, pulmonary edema, thromboembolism, delirium, and atelectasis.
- ventilator-associated pneumonia (VAP) subjective, labor intensive, prone to bias, and accounts for only a small fraction of ICU morbidity
- new surveillance targets — “ventilator-associated events” (VAEs)
- there are very few data at present about whether, how, and to what extent VAEs are preventable.

分级

定义

Ventilator-associated conditions (VAC)

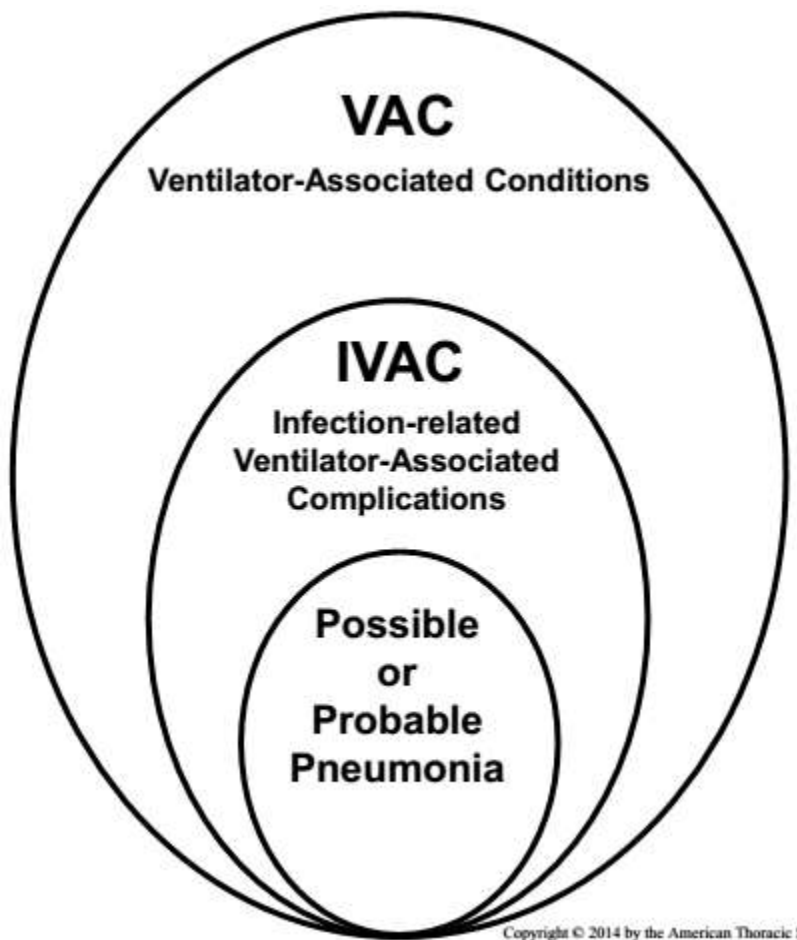
≥2 calendar days of stable or decreasing daily minimum PEEP or FiO₂ followed by rise in PEEP ≥3cmH₂O or rise in FiO₂ ≥ 20 points sustained for ≥2 days

Infection-related ventilator-associated complications (IVAC)

VAC plus:
temp <36 or >38° C
OR WBC ≤4 or ≥12 x 10³cells/mm³
AND ≥1 new antibiotics continued for ≥4 days WITHIN 2 days of VAC onset EXCLUDING first 2 days on the vent

Possible or Probable Pneumonia

IVAC plus:
sputum/BAL with ≥25 neutrophils/field and ≤10 epithelial cells/field
AND/OR positive respiratory culture WITHIN 2 days of VAC onset EXCLUDING first 2 days on the vent



Objective

- We prospectively evaluated the preventability of vaes.
- To test the preventability of vaes by enhancing the consistency, reliability, and co-ordination of daily spontaneous awakening trials (sats) and spontaneous breathing trials (sbts)

Methods

- A prospective surveillance study of VAE epidemiology
- 20 intensive care units (ICUs) affiliated with 13 academic and community hospitals.
 - 12 ICUs elected to participate in the collaborative (“collaborative units”)
 - 8 did not (“surveillance-only units”)
- web-based data-entry system collected the same data on all patients using the same definitions

Intervention

- A consensus protocol for Paired daily SATs and SBTs
- Nurses and respiratory therapists screened all patients daily for eligibility for SATs and SBTs

Results

	Collaborative Units (N=3,425 Episodes)	Surveillance-Only Units (N=1,739 Episodes)
Mean Age (SD)	62.8 (37)	67.2 (48)
Male	1942 (57%)	975 (56%)
Mean SOFA Score (SD)	9.3 (3.7)	9.3 (3.7)
Comorbidities		
Congestive heart failure	793 (23%)	257 (15%)
Chronic lung disease	1,037 (30%)	411 (24%)
Diabetes	1,117 (33%)	447 (26%)
Kidney disease	883 (26%)	253 (15%)
Liver disease	297 (8.6%)	46 (2.7%)
Cancer	430 (13%)	121 (7.0%)
Peripheral vascular disease	502 (15%)	204 (12%)

Results

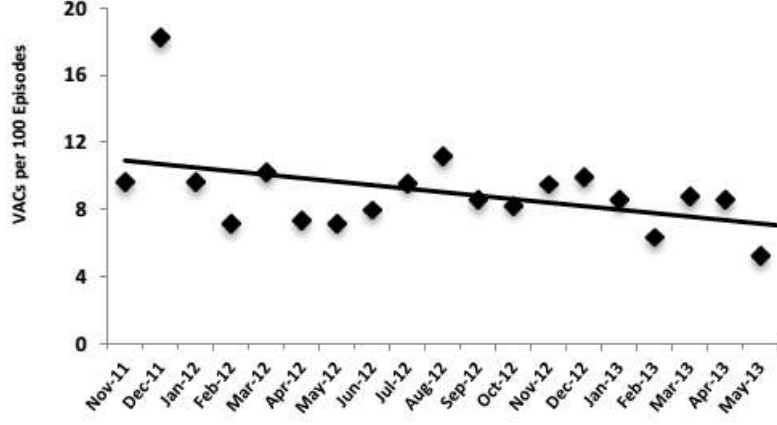
	Collaborative Units (N=3,425 Episodes)	Surveillance-Only Units (N=1,739 Episodes)
Days of mechanical ventilation		
Total	22,991	10,398
Mean (SD)	6.7 (9.2)	6.0 (8.7)
Median (IQR)	4 (3-8)	3 (2-6)
Intensive care length of stay in days		
Mean (SD)	11 (14)	11 (26)
Median (IQR)	8 (5-14)	5 (3-11)
Hospital length of stay in days		
Mean (SD)	22 (25)	18 (29)
Median (IQR)	15 (8-26)	11 (7-19)
Hospital Mortality (%)	958 (28%)	329 (19%)
Ventilator-associated events		
VAC*	293 (8.5%)	75 (4.3%)
IVAC*	100 (2.9%)	31 (1.8%)
Possible Pneumonia	33 (1.0%)	4 (0.2%)
Probable Pneumonia	17 (0.5%)	8 (0.5%)
Possible or Probable Pneumonia	50 (1.5%)	12 (0.7%)

Results

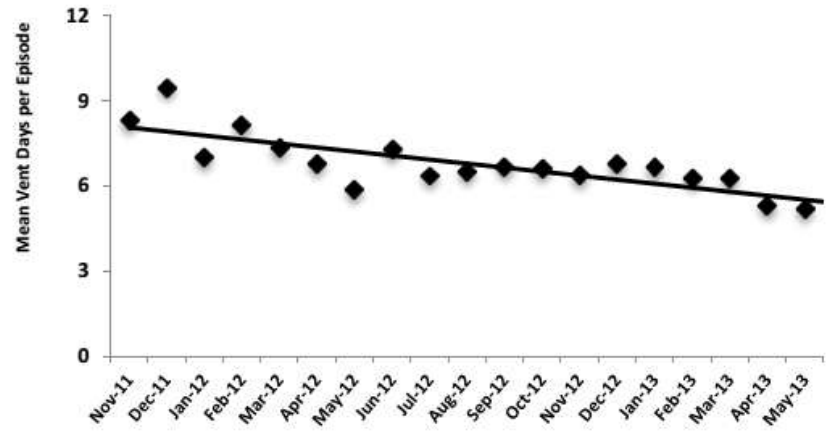
- Changes in SAT and SBT performance rates

Outcome	First Month* (95% CI)	Last Month* (95% CI)	Average Change per Month (95% CI)	Cumulative Change (95% CI)	P
SATs performed as percent of days with SATs indicated	14% (7.1-26)	77% (61-87)	+3.6% (3.3-4.0)	+63% (57-69)	<.0001
SATs performed as a percent of ventilator days	5.1% (3.5-7.5)	21% (16-27)	+0.9% (0.7-1.2)	+16% (11-20)	<.0001
SBTs performed as percent of days with SBTs indicated	49% (35-63)	75% (64-84)	+1.4% (1.0-1.8)	+26% (19-34)	<.0001
SBTs performed as percent of ventilator days	37% (31-43)	35% (30-41)	-0.08% (-0.010 to 0.05)	-1.5% (-2.0 to -0.9)	<.0001
SBTs performed with sedatives off as percent of all SBTs	6.1% (3.9-9.4)	87% (81-92)	+4.8% (4.6-4.9)	+81% (79-84)	<.0001

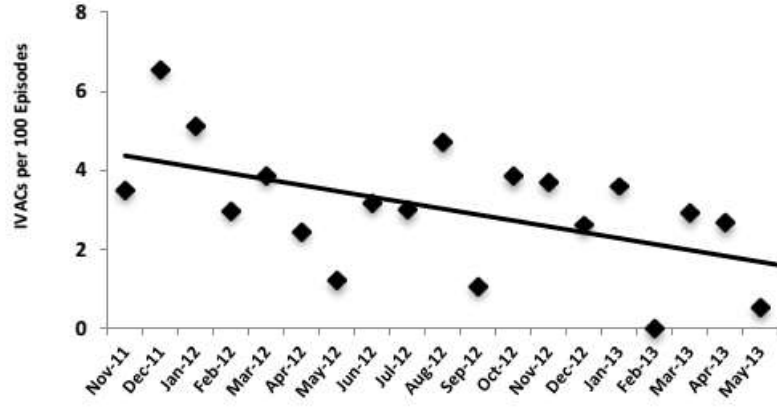
VAC



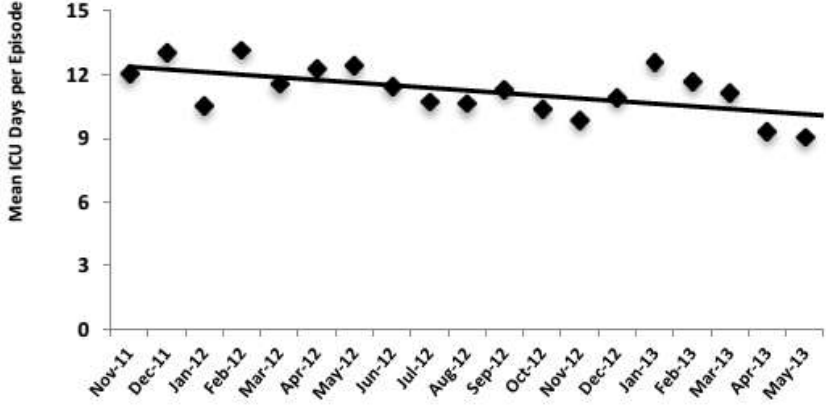
Ventilator Days



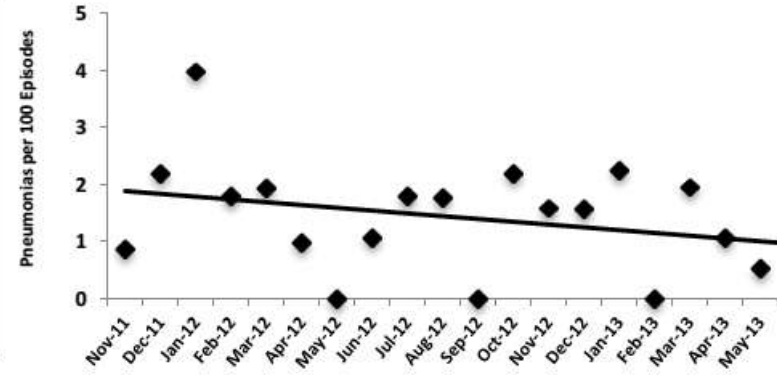
IVAC



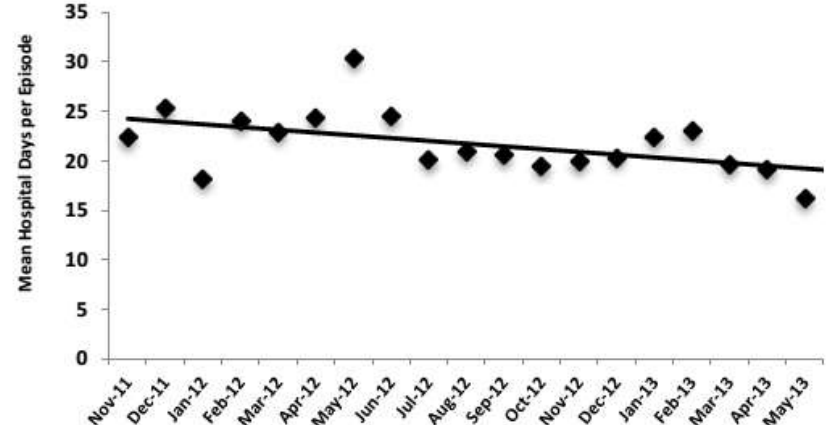
ICU Days



Possible or Probable Pneumonia



Hospital Days



Quality of dying in the ICU: is it worse for patients admitted from the hospital ward compared to those admitted from the emergency department?

Ann C. Long, Erin K. Kross, Ruth A. Engelberg.

Intensive Care Med

(2014) 40:1688–1697

Introduction

- Transfers from hospital wards account for 14–28 % of all admissions to ICU
- a significant burden of comorbidities and a high severity of illness at the time of ICU admission
- higher rates of mortality
- a longer duration of time spent on the wards associated with a greater risk of death
- unable to participate in decision-making following ICU admission
- family perceptions of end-of-life care or potential implications for the delivery of palliative care

Objectives

- To examine associations between ICU admission source (hospital ward vs. ED) and
 - the family ratings of satisfaction with ICU care as measured by the Family Satisfaction in the ICU survey;
 - family and nurse ratings of quality of dying as measured by the single-item Quality of Dying and Death question
 - indicators of palliative care in the ICU.

Methods

- Inclusion
 - acute respiratory failure requiring either non-invasive or invasive mechanical ventilation;
 - The presence of one or more chronic comorbidities, including dementia, heart failure, malignancy, human immunodeficiency virus infection, chronic renal disease, diabetes, cirrhosis, connective tissue disease, chronic immunosuppression, chronic respiratory disease or cerebrovascular disease

Data collection

- Family surveys
 - the Family Satisfaction in the Intensive Care Unit (FSICU) questionnaire
 - family ratings on the single-item Quality of Dying and Death (QODD-1) question
- Nurse questionnaires
 - nurse ratings on the QODD-1
- Palliative care elements

Analysis

- Regression
- Confounders

Patient characteristics	Admission source		<i>p</i>
	Wards (<i>n</i> = 460)	ED (<i>n</i> = 1,040)	
Age at death, mean (SD)	69.3 (12.8)	70.8 (14.4)	0.038*
Sex, <i>n</i> (%)			0.004*
Male	294 (64)	583 (56)	
Female	166 (36)	457 (44)	
Race/ethnicity, <i>n</i> (%)			0.114
White, non-Hispanic	364 (79)	784 (75)	
Hispanic or non-white	96 (21)	256 (25)	
Cause of death, <i>n</i> (%)			<0.001*
Cancer	111 (24)	113 (11)	
Trauma	21 (5)	76 (7)	
Other	328 (71)	851 (82)	
Comorbidities, <i>n</i> (%)			
Malignancy	199 (43)	270 (26)	<0.001*
Respiratory disease	203 (44)	372 (36)	0.002*
Diabetes mellitus	175 (38)	411 (40)	0.589
Heart failure	115 (25)	282 (27)	0.392
Cerebrovascular disease	69 (15)	207 (20)	0.024*
Immunosuppressive state	65 (14)	58 (6)	<0.001*
Liver disease	52 (11)	77 (7)	0.013*
Dementia	48 (10)	139 (13)	0.113
Chronic kidney disease	40 (9)	115 (11)	0.166
Connective tissue disease	12 (3)	26 (3)	0.902
HIV/AIDS	10 (2)	17 (2)	0.469
Hospital admission source, <i>n</i> (%)			0.012*
Home	315 (69)	629 (61)	
Acute care facility	62 (14)	147 (14)	
Skilled nursing facility	54 (12)	191 (18)	
Group home	5 (1)	21 (2)	
Office/clinic	8 (2)	12 (1)	
Rehab	6 (1)	18 (2)	
Homeless	3 (1)	14 (1)	
Unknown	7 (2)	8 (1)	
Discharge service, <i>n</i> (%)			0.565
Medicine (or subspecialty)	407 (89)	922 (89)	
Surgical	49 (11)	114 (11)	
Other	3 (1)	3 (0)	
Unknown	1 (0)	1 (0)	
ICU LOS (days), mean (SD) ^a	7.4 (10.8)	5.2 (7.5)	<0.001*
Ward LOS (days), mean (SD)	10.0 (12.9)		

Results

Family characteristics ^a	Patient admission source	
	Wards (<i>n</i> = 173)	ED (<i>n</i> = 408)
Age at time of survey, mean (SD) ^b	58.3 (15.0)	57.8 (14.5)
Sex, <i>n</i> (%)		
Male	54 (31)	114 (28)
Female	116 (67)	283 (69)
Unknown	3 (2)	11 (3)
Race/ethnicity, <i>n</i> (%)		
White, non-Hispanic	143 (83)	325 (80)
Hispanic or non-white	26 (15)	67 (16)
Unknown	4 (2)	16 (4)
Relationship to patient, <i>n</i> (%)		
Spouse/domestic partner	91 (53)	161 (40)
Child	56 (32)	153 (38)
Sibling	13 (8)	26 (6)
Parent	6 (4)	13 (3)
Other relative	3 (2)	35 (9)
Friend	1 (1)	11 (3)
Unknown	3 (2)	9 (2)
Lived with patient, <i>n</i> (%) ^c	111 (64)	220 (54)
Years of relationship with patient, mean (SD) ^d	42.1 (16.2)	43.9 (15.8)

Survey scores and elements of palliative care	Patient admission source		<i>n</i>	β /OR	95 % CI	<i>p</i>
	Ward	ED				
Survey scores, mean (SD)						
QODD-1 ratings ^a						
Family scores	6.5 (3.3)	7.3 (2.9)	555	-0.82	-1.41, -0.24	0.006*
Nurse scores	7.1 (2.9)	7.3 (2.6)	564	-0.16	-0.66, 0.33	0.510
FS-ICU ratings ^b						
Total satisfaction	74.1 (22.6)	79.1 (18.1)	566	-4.94	-8.77, -1.10	0.012*
Satisfaction with care	75.0 (22.2)	80.7 (18.3)	563	-5.64	-9.46, -1.83	0.004*
Satisfaction with decision-making	73.5 (25.1)	76.7 (20.6)	572	-3.21	-7.49, 1.06	0.141
Elements of palliative care in the ICU (%)						
Family conference, 1st 72 h of ICU admission	71	78	1,493	0.70	0.54, 0.89	0.004*
Prognosis discussed, 1st 72 h of ICU admission	33	40	1,492	0.75	0.59, 0.94	0.014*
DNR order in place at the time of death	81	83	1,488	0.84	0.64, 1.12	0.242
Life support withheld or withdrawn	78	74	1,490	1.20	0.92, 1.56	0.174
Spiritual care provided	53	45	1,498	1.33	1.07, 1.66	0.012*

Survey scores and indicators of palliative care	<i>n</i>	β	95 % CI	<i>p</i>
QODD-1 ratings ^b				
Family ratings ^c	544	-0.90	-1.54, -0.26	0.006*
Nurse ratings	564	-0.12	-0.62, -0.37	0.628
FS-ICU ratings ^b				
Total satisfaction ^d	566	-3.97	-7.89, -0.05	0.047*
Satisfaction with care	563	-5.40	-9.44, -1.36	0.009*
Satisfaction with decision-making	572	-2.77	-7.16, 1.62	0.216
	<i>n</i>	OR	95 % CI	<i>p</i>
Elements of palliative care in the ICU ^e				
Family conference, 1st 72 h of ICU admission	1,493	0.68	0.52, 0.88	0.004*
Prognosis discussed, 1st 72 h of ICU admission	1,492	0.72	0.56, 0.91	0.007*
DNR orders in place at the time of death	1,488	1.01	0.74, 1.38	0.949
Life support withheld or withdrawn ^d	1,490	1.38	1.04, 1.82	0.025*
Spiritual care provided	1,498	1.48	1.14, 1.93	0.003*

